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M. D. T H E S I S

VACCINE TREATMENT OF PUERPERAL INFECTION

ROBERT ROBERTSON FASSON

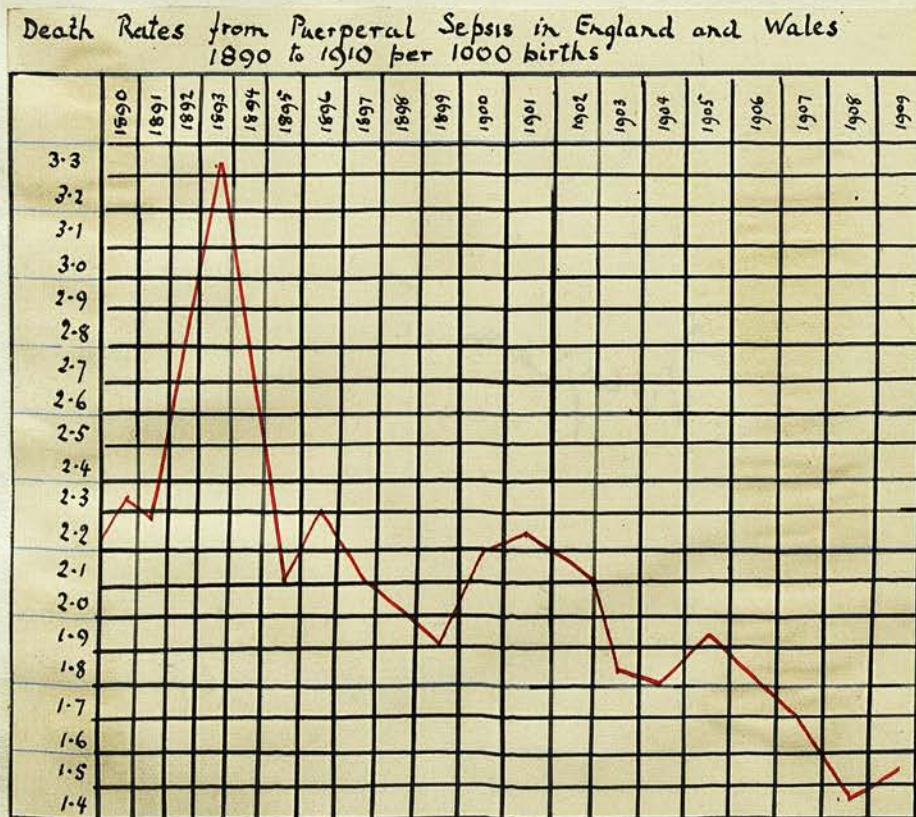
M.B., Ch.B.

March 1912.



VACCINE TREATMENT OF PUERPERAL INFECTION

The introduction of vaccine therapy in the treatment of puerperal infection, though of recent date seems to hold out promise of its being a valuable adjunct to the treatment of this disease. Although for the last 10 years there has been a definite and steady reduction in the death rate for Puerperal septic disease, yet at the present time it is responsible for upwards of 40 % of the total child bed mortality. The accompanying chart from a paper by Routh shows this fall in death rate in a striking manner.



On the average more than 2000 women die every year in England and Wales from puerperal Sepsis. Reliable information as regards the number of cases has been very difficult to obtain till now as notification has not been enforced, but in Dec. 1910 the Local Government Board issued a general order requiring every medical officer of health to send in weekly returns of infectious diseases including puerperal sepsis. The following figures relating to notifications and deaths of Puerperal sepsis in the administrative county of London are of interest. The estimated population in the middle of 1911 was 4,522,628. During the period Dec. 1910 to June 1911, 145 cases of puerperal fever were notified and 68 deaths from puerperal fever occurred in the same period. This gives a death rate of 46.9 per cent of cases notified. By this order the Local Government Board recognized also the infective nature of this disease and all cases should be treated with the greatest precautions to avoid its spread. The removal of cases to isolation hospitals is desirable in cases occurring in houses in which these precautions cannot be successfully carried out.

The term vaccine as applied to this form of treatment arose from the analogy of the procedure to that of vaccination, which is the production of immunity

to smallpox by the inoculation of the virus of vaccinia or cowpox and vaccine therapy is also the production of immunity by the inoculation of attenuated cultures applied in disease. Vaccine therapy is due chiefly to the investigations of Sir Almroth Wright, he defines a vaccine as any substance which when introduced into the body causes there an elaboration of protective substances. Surgeons and Physicians alike are now realizing that in the case of bacterial disease great benefit may be obtained from the administration of a corresponding vaccine.

(2)
Wright & Douglas demonstrated that the blood serum performs a definite role in the process of phagocytosis and they showed that the phagocytosis of Staphylococci depended on a body in the normal serum which became fixed to the cocci and made them a prey to the phagocytes, to this body they gave the name of Opsonin.

They enunciated the doctrine that the more opsonin for a particular organism that is present in the patient's blood the greater will be that patient's resistance to that particular organism.

(3)
Bullock & Western showed that there is more than one opsonic substance present and that opsonins are specific for the particular bacteria on which they

exert their opsonic action.

Vaccine treatment consists therefore in bringing about an increase in the anti bacterial substances of the blood by injecting into the patient an appropriate number of dead bacteria of the particular species which is causing the morbid process present in the patient, as Wright states "we do not in the case of these inoculations supply to the patient protective substances produced in the organism of an animal vicariously inoculated but we induce the chemical machinery of the patient to elaborate by its own efforts the protective secretion which is required for the destruction of the invading bacteria, this elaboration of this protective secretion proceeds in accordance with the general law that a vaccine introduced into the organism will, given that it is introduced in appropriate doses and at proper intervals, call forth a production of the specific bacteriotropic substances which are required for the destruction of the bacteria against which protection is desired."

The value of vaccine therapy is difficult to estimate -- therapeutic argument is always difficult -- this difficulty is due chiefly to the absence of proper controls. The prophylactic use of vaccine in Typhoid fever is at present the only example of the use of vaccines in which scientific proof of their efficacy exists. So failing

the application of scientific methods to the investigation of the value of vaccine therapy as applied to human disease one is thrown back upon the general impression gained by the numerous records of good results which have now been published. These include all varieties of cases from extremely chronic ones to those of the most acute character.

The variety of Bacterial infections which have been treated by vaccine therapy is large.

(4)
Louisson gives the following list of organisms from which vaccines have been prepared and of which therapeutic use has been made — Streptococcus Longus, Staphylococcus, Pyogenes Aureus and Albus, Bac.: Coli Pneumococcus, Bac: Influenza, Micrococcus Catarrhalis, Bac: Acne, Bac: Typhosus; Gonococcus, Bac. Dysenteriae, Bac: Pestis, Bac: Anthracis, Vibrio Cholerae, and Micrococcus Melitensis.

Wright insists upon the desirability of controlling dosage of vaccines by the opsonic index, but as even in the hands of the most skilled bacteriologists indices in the case of Tubercle Bacillus varying between .8 and 1.2 are to be reckoned as unity — that is to say no deduction can be drawn from indices falling between these limits — the difficulty of this procedure in the hands

of any one but the highly skilled specialist is apparent.

This difficulty applies equally in the case of opsonic work with streptococci.

Now thanks to experience gained by the large record of cases successfully treated with control by opsonic indices and by close observation of the co-relation between the clinical symptoms and the behaviour of the opsonic index present in these cases the results of correct dosage can be accurately estimated by clinical evidence. So by careful attention to clinical symptoms it is possible to successfully regulate the dosage and the correct interval of time between the doses without having recourse to the assistance of a pathologist for repeated reports on the opsonic index of patient.

Wright in employing vaccine therapy to the treatment of disease brought into use one of the methods which had already been employed to produce immunity for prophylactic purposes — namely that of vaccination.

(5)
Muir divides the different methods by which immunity may be artificially produced as follows :
A Active immunity — i.e. produced in an animal by an injection of non-lethal doses of an organism or its toxin.

(1) By injection of living organisms

- (a) Attenuated in various ways.
- (b) in non-lethal doses.
- (2) By injection of dead organisms.
- (3) By injection of filtered bacterial cultures i.e. toxins.

B. Passive immunity i.e. produced in one animal by injection of the serum of another animal which has been highly immunized by the methods of A. Vaccination is active immunity produced by injection of dead organisms.

Wright contends that the justification of vaccine therapy lies in the fact that in many cases infections are to be looked upon as partially localized and the reason for the bacteria being able to grow locally is that in the part of the body affected there is a deficiency of the opsonic power of the body fluids which is essential for the phagocytosis of the invading bacteria, and that any procedure which will raise the opsonic power of the body fluids as a whole and so of the body fluids at the affected part of the body will aid the destruction of the bacteria by preparing them for the phagocytic action of the leucocytes.

(6)
Oastler has recorded the results obtained by him by vaccine treatment in some cases of puerperal infection, he stated the injections were of most value in subacute forms of infection pursuing a somewhat prolonged course,

but that in the acute forms of septicaemia the injections were unsuccessful.

In general streptococcic infections a few examples only have been recorded in which favourable results have followed the injection of a suitable vaccine.

(7)
Barr & Douglas reported a case which was complicated by ulcerative endocarditis, and treated by vaccine and which recovered.

(8)
Wright in his recent work reports a case of "Malignant endometritis" treated by vaccines which recovered and Jewett (9) reports a case of acute infection with streptococci circulating in the blood in which a marked beneficial effect followed each injection and after the third dose the fever ceased completely.

The injection of immune serum on the other hand confers immunity by raising the patients resistance by the addition of already formed antibodies, either anti-Toxic or anti-bacteriacidal. The most brilliant results in this method of treatment have been gained in the treatment of Diphtheria by Diphtheritic antitoxin. Behring in 1894 published the first statistics and his results have since been confirmed. In the case of Puerperal Sepsis Wilson (10) states that antistreptococcic serum treatment has not hitherto been characterized by any marked success.

(11)
Bumm reports that in severe cases such as parametritis or thrombo-phlebitic infection the serum entirely fails to produce any effect. He believes however that in early stages of streptococcic infection of the uterus the serum exerts a favourable influence in preventing further extension of infection.

(12)
Gordon advises doses of 100 cc and believes that if administered early a favourable influence is exerted.

As regards the bacteriology of Puerperal Infection the most frequently found organism is the streptococcus it is however not infrequently present in the vaginal and uterine secretion after delivery in cases pursuing a normal course. Much research work has been done lately to discover whether the streptococci found in severe forms of puerperal infection are different from the saprophytic form or not. No constant difference in their morphology or in their mode of growth or staining reactions has been as yet detected.

In 1892 Doderlein described two forms of vaginal secretion as existing in pregnancy. In the normal condition the vaginal secretion is scanty and intensely acid, and is characterized by the presence of long anaerobic bacilli which produce lactic acid and exert a bacteriacidal influence on bacteria introduced from without. The other type which he considered pathological

was characterized by a profuse secretion, only slightly acid in reaction and containing a large number of micro-organisms including streptococci which were present in 10 % of his cases,

Bumm in 1904 reported that he was able to cultivate streptococci in 30 % of women examined during a normal pregnancy.

The vaginal discharge during the first 24 hrs. after delivery contains relatively few organisms, the result of the cleansing process which occurs as a result of the passage of the child's head and placenta and membranes; but after the 2nd day a large number of organisms may be cultivated from the vaginal lochia.

The uterus after delivery has been found to frequently contain organisms. Mansfield⁽¹³⁾ recently examined the intrauterine secretion of 40 afebrile women on the 4th and 5th days after delivery. He was able to detect organisms in 60 % of these cases, and streptococci were present in 22 %

Nicholson & Evans⁽¹⁴⁾ believe that the positive results obtained by a large number of observers are due to faulty technique and that the secretion in the uterus is sterile in normal cases throughout the puerperium, their observations were made by the introduction of a speculum along the cervical canal through which a tube was passed into the uterine cavity, and

in their cases where streptococci were observed there was always associated with them symptoms of infection.

From this somewhat conflicting evidence Lea & Sidebotham⁽¹⁵⁾ come to the following conclusion, namely, that organisms closely resembling those present in puerperal infection often exist in the upper part of the vagina and in the cervical secretion shortly after delivery and that this is frequently followed¹ by invasion of the lower portion of the uterine cavity. But that either due to the scarcity of the organisms or to their possessing a very slight degree of virulence, or to the considerable resisting power of the patients in the great majority of cases the course of the puerperium is entirely uninfluenced by the presence of these organisms.

Lately much significance has been attributed to the haemolytic power of streptococci as an indication of their virulence.

Schottmuller⁽¹⁶⁾ claimed that it was possible to determine the virulence of streptococci by this means and that this haemolytic power is proportionate to the virulence of the organism.

Fromme's⁽¹⁷⁾ observations confirm this point -- in 36 lochial discharges of afebrile women streptococci were present in 19 cases but more of these were haemolytic

in 14 women who presented signs of severe infection haemolytic streptococci were found in the lochia. On the other hand Freymuth⁽¹⁸⁾ has disputed these conclusions and has found streptococci in the vaginal secretion of 20 pregnant women and compared these with a strain of streptococci derived from a fatal case of puerperal infection. He found no constant relation in the haemolytic power and regards haemolysis as of no value in distinguishing Pathogenic from Saprophytic varieties of streptococci.

Lee & Sidebotham also showed that Haemolytic streptococci may exist in the lochial discharge without any evidence of infection.

The present conclusion seems to be that although there can be no doubt that the streptococci present in cases of severe infection are characterized by great haemolytic activity, we do not possess in the haemolysis of streptococci any absolute indication of the virulence of the organism.

Staphylococci were also frequently present in the lochia discharges and are very commonly present in local infections of the vulva and vagina. In rare instances staphylococci may invade the blood stream and produce general infection -- usually of the pyaemic type. The frequency of staphylococcic infection of the uterus does

not exceed 5 % of all cases.

(19)
Bumm () mentions cases caused by Bac: Coli, this organism is especially liable to be the infecting one in cases where there has been laceration of the perinaeum, they cause puerperal ulcers but may also spread up and infect the whole genital tract. The gonococcus is frequently present in the generative tract during pregnancy and labour and plays an important part in the causation of puerperal infection. It most frequently produces localized infection of a mild type but now and then a generalized infection occurs.

Numerous cases of infection of the uterus have occurred in which the pneumococcus has been the infecting organism. Natvig has recently described a diplococcus in the vagina of healthy women during pregnancy which is closely allied to the pneumococcus, many believe that this organism is only a variety of the streptococcic group.

Tetanus Bacillus has been the infecting organism it was carried up into the genital tract by midwives whose hands had been in contact with soil. The Diphtheria Bac: has also been found in several cases, it may form a membrane which invades the whole genital tract.

The Bacillus aerogenes capsulatus was the infecting cause in 12 cases reported by Little (20) . This

organism is always present in human faeces but is not normally present in the vulvar or vaginal secretion.

Formerly the anaerobicputrefactive bacteria were thought to be the cause of puerperal infection, many varieties were isolated such as the bacillus.

Fundibuliformis, bacillus radiiformis and the proteus group. Now it is believed that they produce decomposition on any fragments of membrane or placental tissue or in blood clots which the uterus may contain thus forming a suitable nidus for growth of pyogenic organisms. and further that they tend to increase the virulence of the infective bacteria such as streptococcus and the Bacterium Coli, with which they are associated.

Mixed infections by Streptococci and Bac: Coli are common causes of Puerperal infection. Cases are reported
(21) by Crowe & Wynn also by Hawkyard (22).

During the past 18 months the treatment of puerperal infection in the Rotunda Hospital by vaccine therapy has been extensively employed and the results achieved seem to justify the faith reposed in this form of treatment and in its adoption as a routine procedure. For permission to report the following cases I am indebted to the kindness of Dr. H. Jellett, Master of the Rotunda Hospital.

The method employed to obtain cultures in these cases

was as follows. The external genitals were washed with soap and creolin solution. A catheter was passed. No vaginal douche was given. A Fergusson's Speculum was introduced into Vagina and the external os was cleaned with a sterile swab on a pair of forceps. A sterile glass tube was then passed into the uterine cavity and connected by means of a piece of sterile rubber tubing to a sterile glass syringe the uterine secretion was then aspirated into the glass tube which was then removed from uterus and sealed at both ends.

Case I.

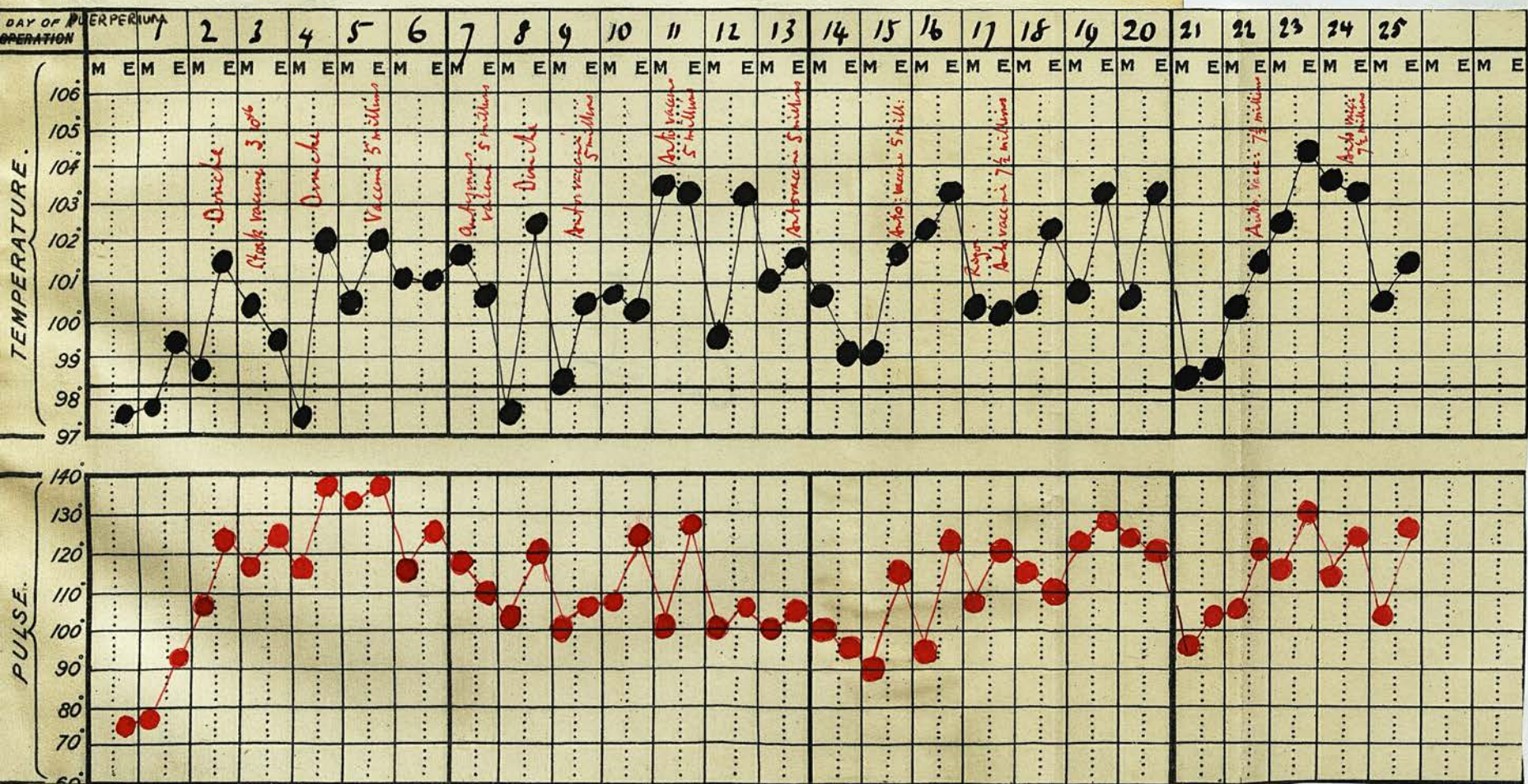
Mrs. E.L., 40 years, 9th Pregnancy.

Labour -- child born without difficulty, adherent
placenta-manual removal.

Temperature and pulse as in chart below. On 2nd evening she was given an Intra-uterine douche, uterus was found to be empty, uterus plugged with Iodoform gauze. On 3rd evening she was given Stock Streptococcic vaccine 3 millions. On 4th evening an Intra-uterine douche was given, uterus perfectly clear, culture was taken and result streptococci present. On 5th evening she was given Stock Streptococcic vaccine 5 millions. On 7th evening she was given autogenous streptococcic vaccine 5 millions. On 10th evening uterus was again douched and some fibrinous material removed. On the 11th, 13th and 15th evenings she was given Autogenous streptococcic vaccine 5 millions. On the 16th evening autogenous vaccine 5 millions were given. On the 18th evening patient had a rigor. On the 19th day patient was found to be suffering from some Cellulitis of right Sacro-iliac region. On the 22nd evening 25 millions Stock Staphylococcic vaccine was given. On the 23rd on examination a small hard swelling was felt behind and to the right, no tenderness, remainder of pelvis was normal. On the 24th patient was given autogenous Streptococcic vaccine. On the 25th day patient died.

During the whole period there was no discharge of offensive lochia. This case is the only death to record in the series under review. In spite of the stock Streptococcic vaccine used on the 3rd and 5th evenings and of the autogenous vaccine used from the 7th evening onwards and in spite of routine douching and other local treatment the case showed no improvement. The temperature and pulse curves show the usual evening rise and morning remission one expects to find in cases of this disease, and there is no signs of the vaccine treatment having had any beneficial effect. This case differs from the other cases recorded in that on the 9th day evidence of pelvic Cellulitis developed.

The Streptococcic vaccine prepared from this patient is the one which was used in the treatment of the following cases with apparently marked beneficial results.



Case II.

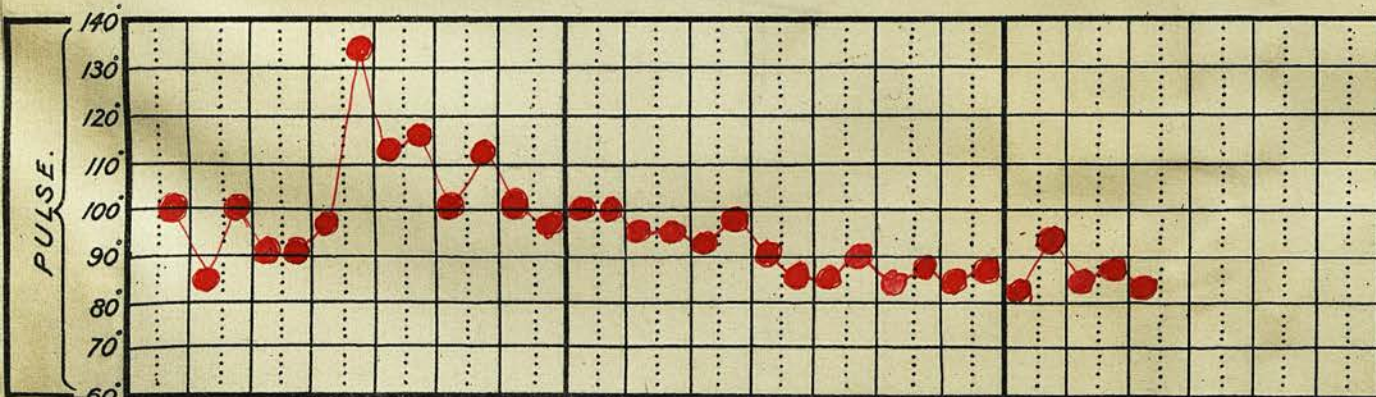
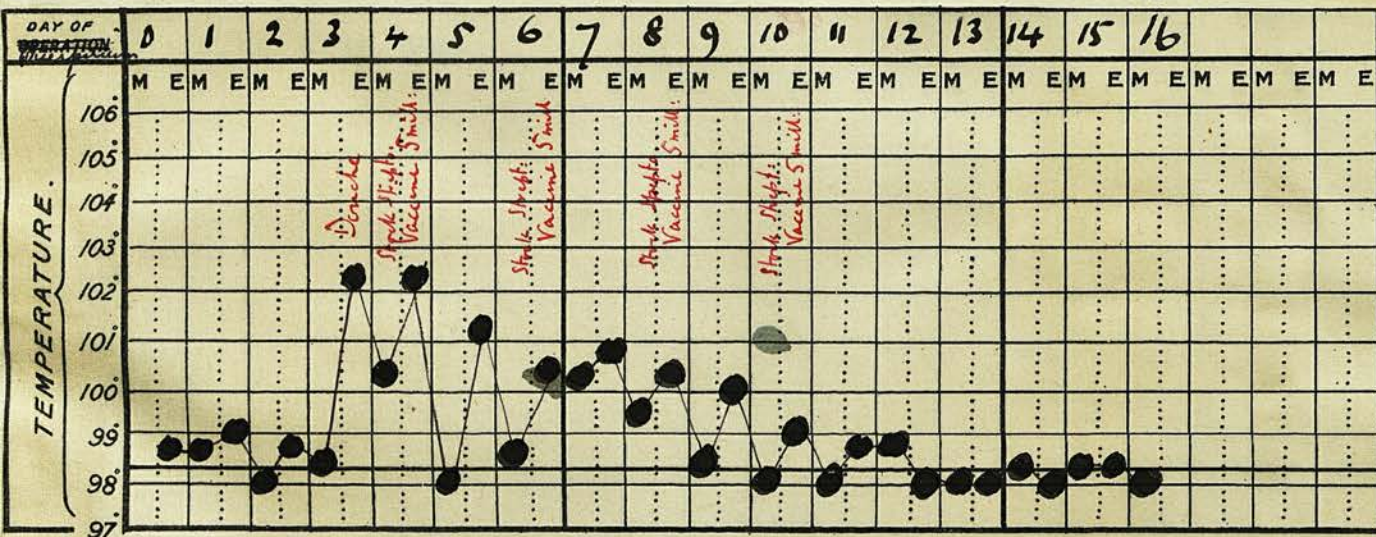
Mrs M.E., 35 years, 4th Pregnancy.

Labour. Placenta praevia centratis - Bipolar version.

Placenta came away complete.

Temperature -- pulse as in chart below. On the 3rd evening an intra-uterine douche was given, a culture was taken which showed streptococci to be present, uterus plugged with Iodoform gauze, the uterus was empty.

This patient was treated by administration of stock streptococcic vaccine on the 4th, 6th, 8th and 10th evenings. At no period were the lochia offensive. The patient made a good recovery and was discharged on the

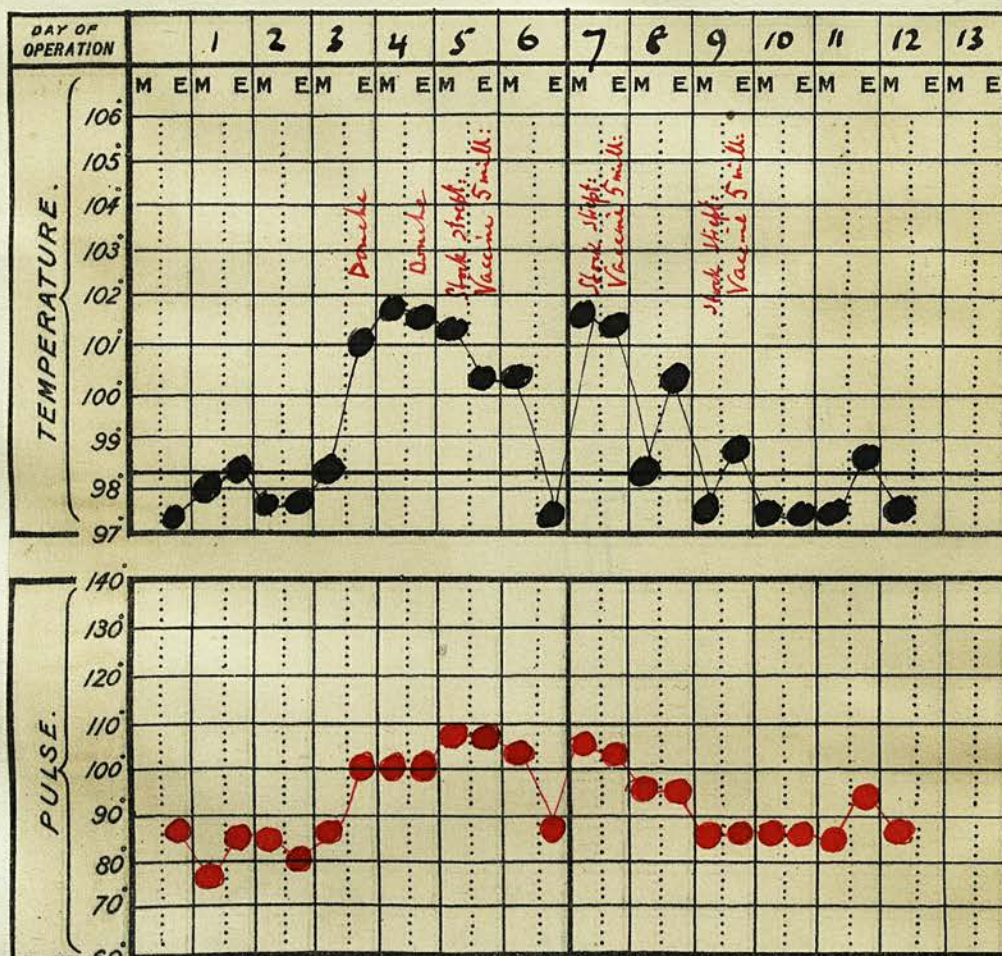


Case III.

Mrs. M.F. 33 years, 9th Pregnancy.

Labour. Normal. Placenta complete membranes incomplete.

Temperature and pulse as in chart below. On 3rd evening patient was given an intra-uterine douche, several pieces of membrane removed, uterus was plugged with Iodoform gauze. On 4th evening patient was again given an intra-uterine douche -- uterus empty. Culture taken showed streptococci present. On the 5th evening patient was given stock streptococcic vaccine 5 millions, On the 7th and 9th evenings stock streptococcic vaccine 3 millions was given. The lochia was at no period offensive. Patient made a good recovery and was discharged on the 12th day.



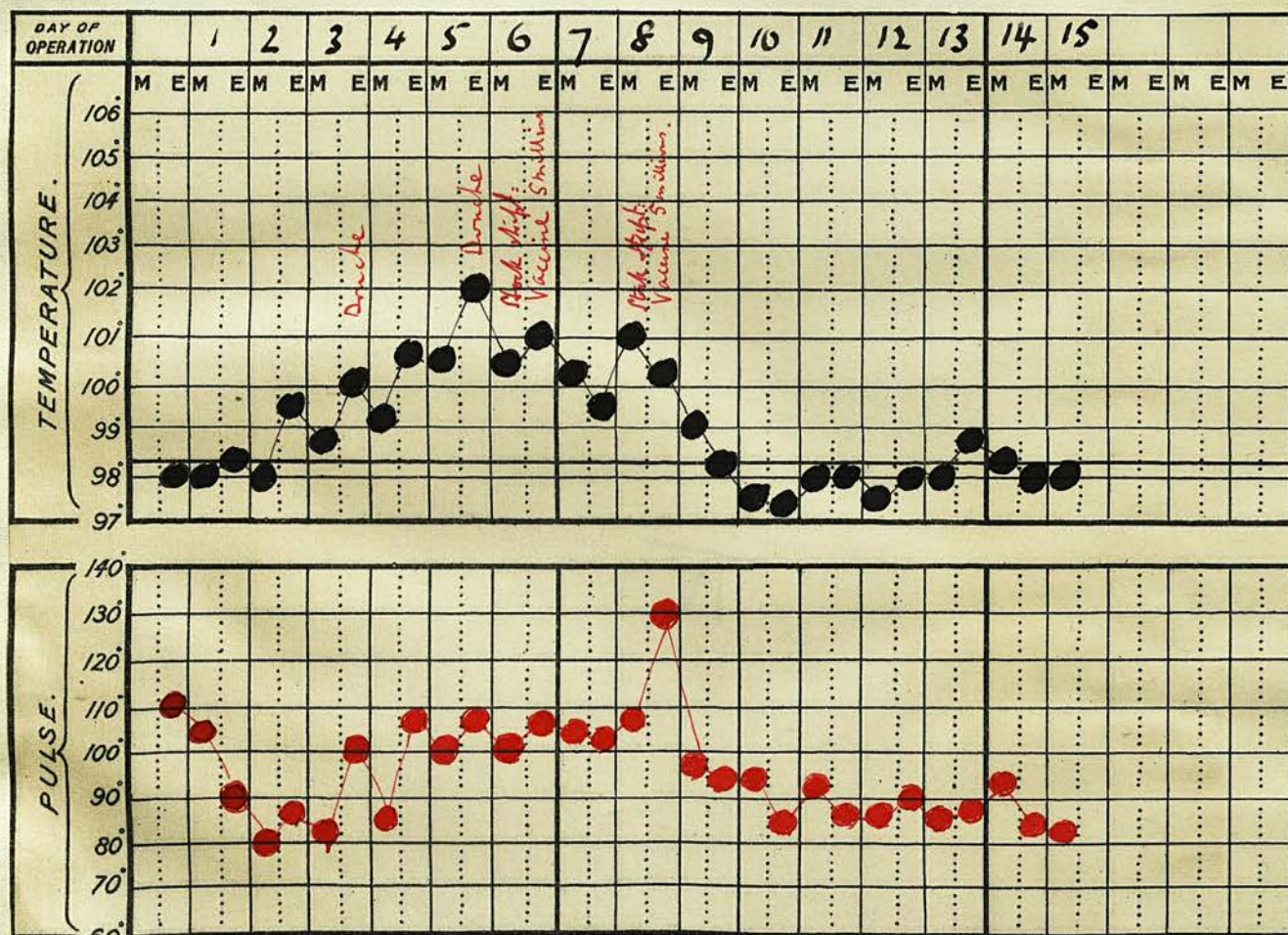
Case IV.

Mrs K.R., 35 years, 1st Pregnancy.

Labour. Forceps delivery, placenta complete, membranes incomplete.

Temperature and pulse as in chart below. On 3rd evening patient was given an intra-uterine douche -- several large pieces of membrane were removed, culture taken, showed streptococci to be present -- uterus plugged with Iodoform gauze. On 4th day a puerperal ulcer appeared, it was treated with Tinct Iodi and dusted with Iodoform powder. On the 5th ^{day} ulcer was much improved an intra-uterine douche was given, some debris and blood clots removed and uterus plugged with Iodoform gauze. On the 6th and 8th evenings stock

recovery and was discharged on the 14th day.



Case V.

Mrs. M.M., 18 years, 1st Pregnancy.

Labour. Impacted breech. Patient in labour 4 days.

Membranes ruptured 25 hours previous to delivery.

Placenta and membranes complete.

Temperature and pulse as in chart below. On 2nd

evening patient was given an intra-uterine douche, nothing

got away from uterus. Culture taken showed streptococci

to be present. Uterus plugged with Iodoform gauze.

Patient was given stock streptococcic vaccine $2\frac{1}{2}$ millions.

On the 4th, 5th, 7th, 9th, 11th, 14th, 16th and 18th

evenings patient was given streptococcic vaccine 5

millions. On the 18th evening an intra-uterine douche

was given uterus was absolutely clean. On the 5th to

10th days the Lochial discharge was offensive. Patient

made a good recovery and was discharged on the 20th day.

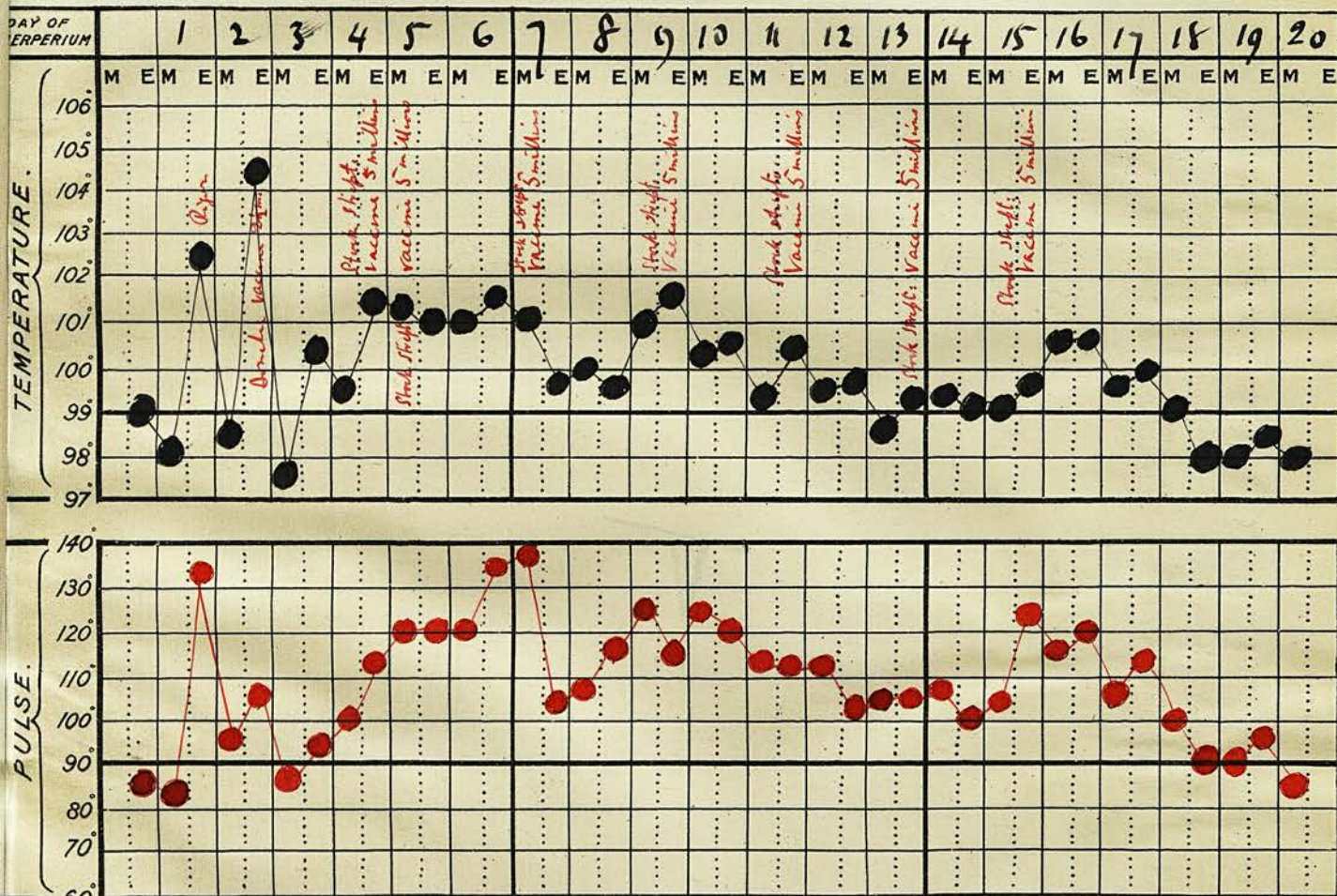


Chart VI.

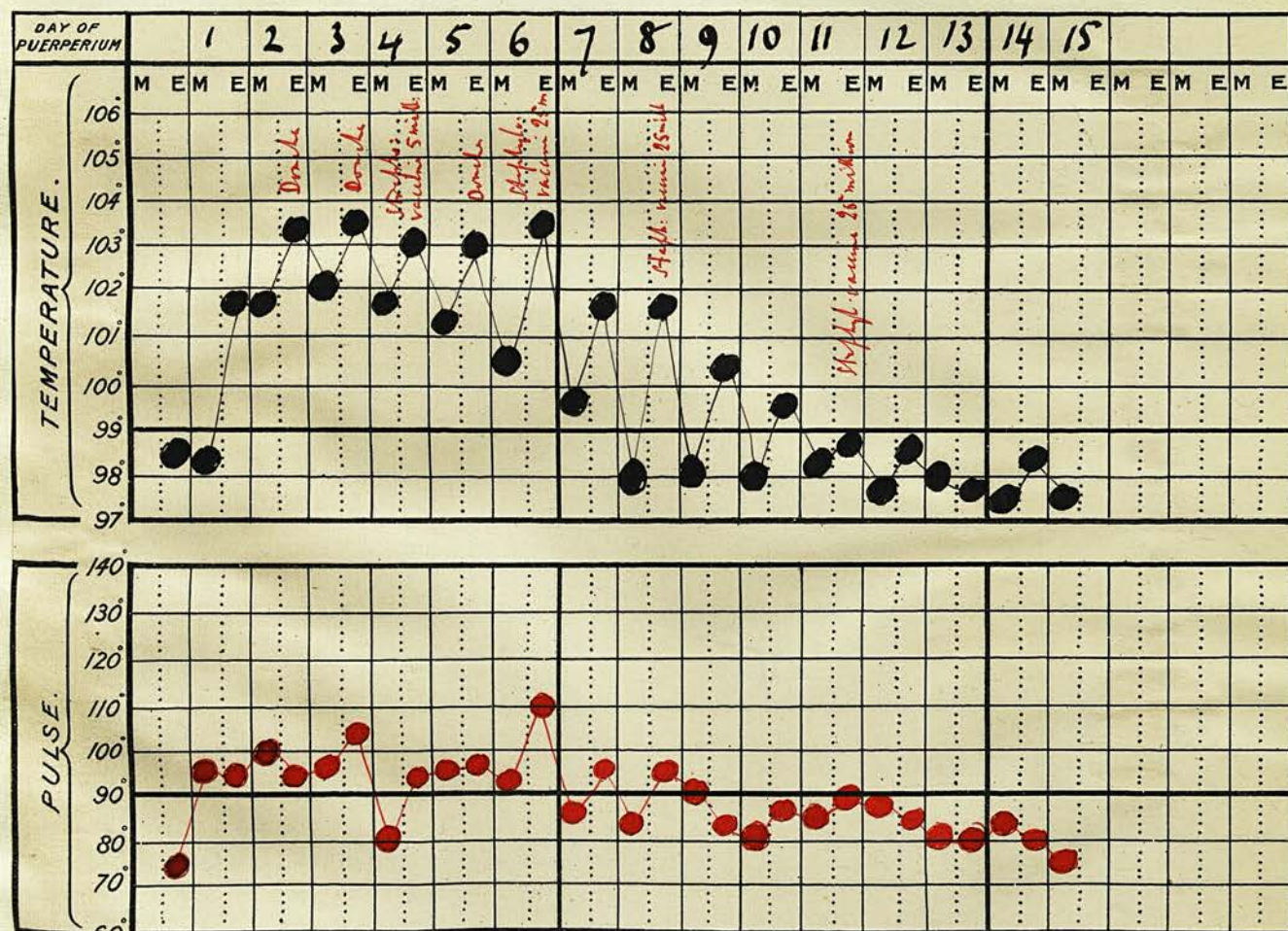
Mrs. K.M., 25 yrs., 1st Pregnancy.

Labour. Forceps delivery Membranes and placenta complete.

Temperature and pulse as chart below. On 2nd evening patient was given an intra-uterine douche -- quantities of blood clot removed, culture taken showed Streptococci to be present. Uterus packed with Iodoform gauze.

On 3rd evening another douche was given and uterus was found to be empty. On the 4th evening patient was given Stock Streptococcic vaccine 5 millions. On the 5th evening patient was given an intra-uterine douche, uterus was empty, culture was taken and showed Staphylococci to be present, On the 6th and 8th evenings stock Staphylococcic vaccine 25 millions was given. The lochia was not offensive at any period. Patient made a good recovery and was discharged on the 15th day. This

case is of interest showing failure of streptococcic vaccine given at first and success of Staphylococcic vaccine given subsequently on the Staphylococcus being found in 2nd culture.



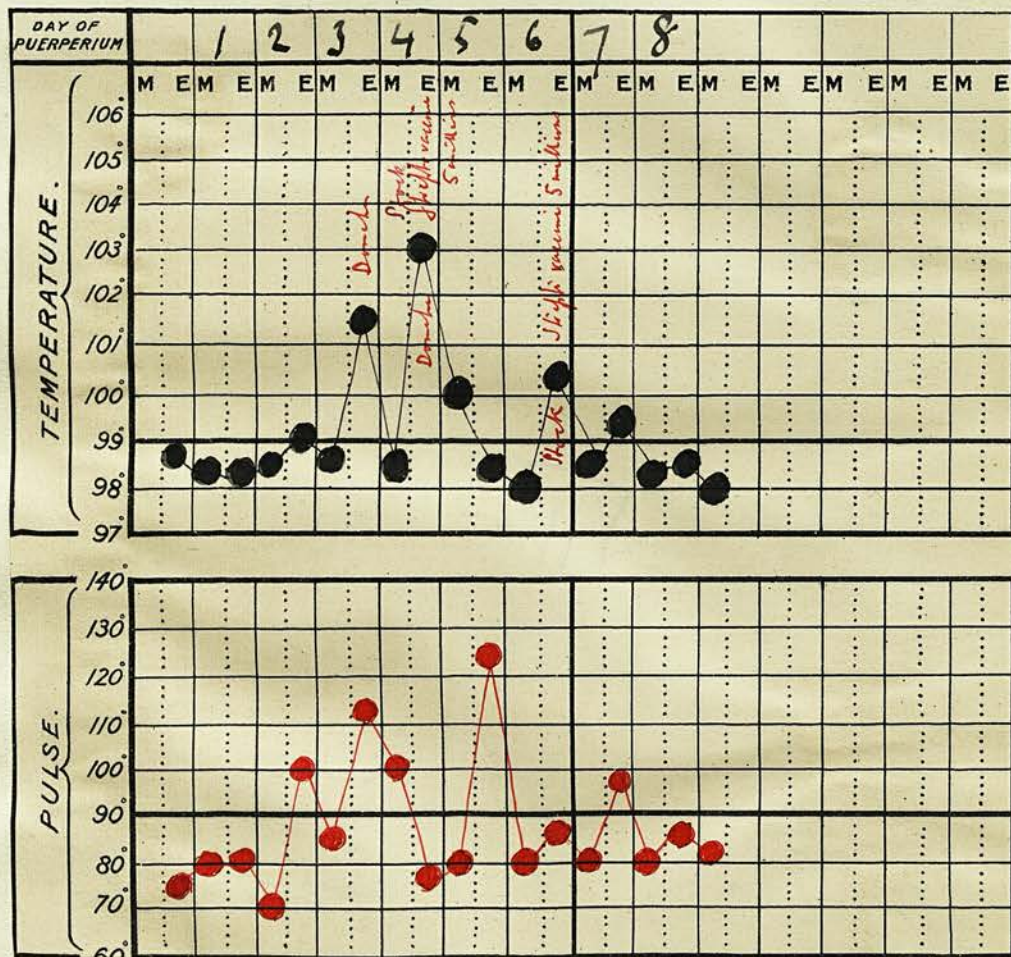
Case VII.

Mrs. B.C., 19 yrs., 1st Preg.

Labour. Normal delivery. Membranes and placenta complete. Small perineal tear, 1 catgut stitch.

Temperature and Pulse as in chart below. On 3rd evening patient was given an intra-uterine douche, some decidua and blood clot removed. Uterus packed with Iodoform gauze. Culture was taken which showed presence of Streptococci. On 4th evening patient again had an intra-uterine douche and a small amount of decidua and blood clot was removed, patient was given Stock Streptococcic vaccine 5 millions and again on the 6th evening she received Stock Streptococcic vaccine 5 millions. The lochia was not offensive. Patient

made a good recovery and was discharged on the 9th day.



Case VIII.

Mrs. R.S., Age 30. Preg. 6th.

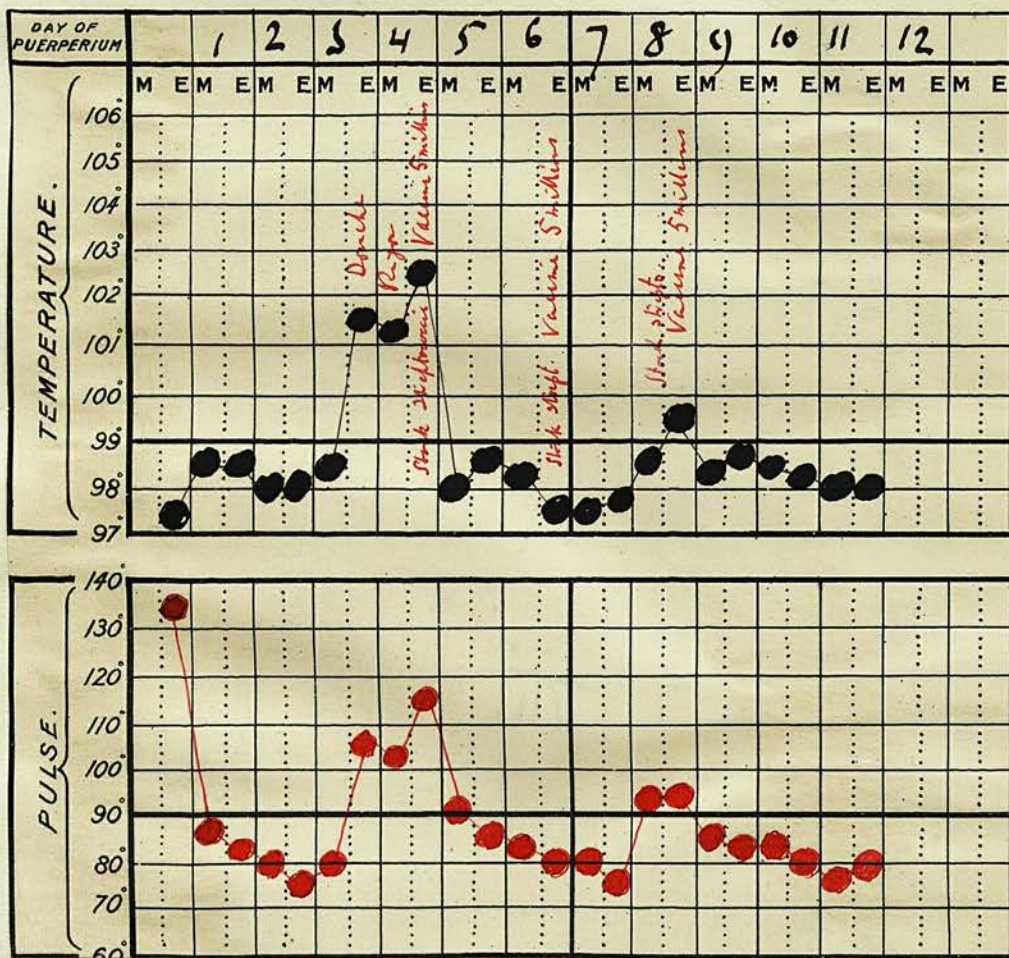
Incomplete abortion (3 months) Uterus was emptied with a Rhinistadter curette, douched and plugged with Iodoform gauze.

Temperature and pulse see Chart below. On 3rd evening patient was given an intra-uterine douche and some debris removed with a Rhinistadter curette, culture taken showed streptococci to be present.

On 4th evening patient was given Quinine gr. X. and on the 4th, 6th, and 8th evenings patient was given stock Streptococcic vaccine 5 millions. Lochia was

not offensive at any period. Patient made a good

recovery and was discharged on the 12th day.



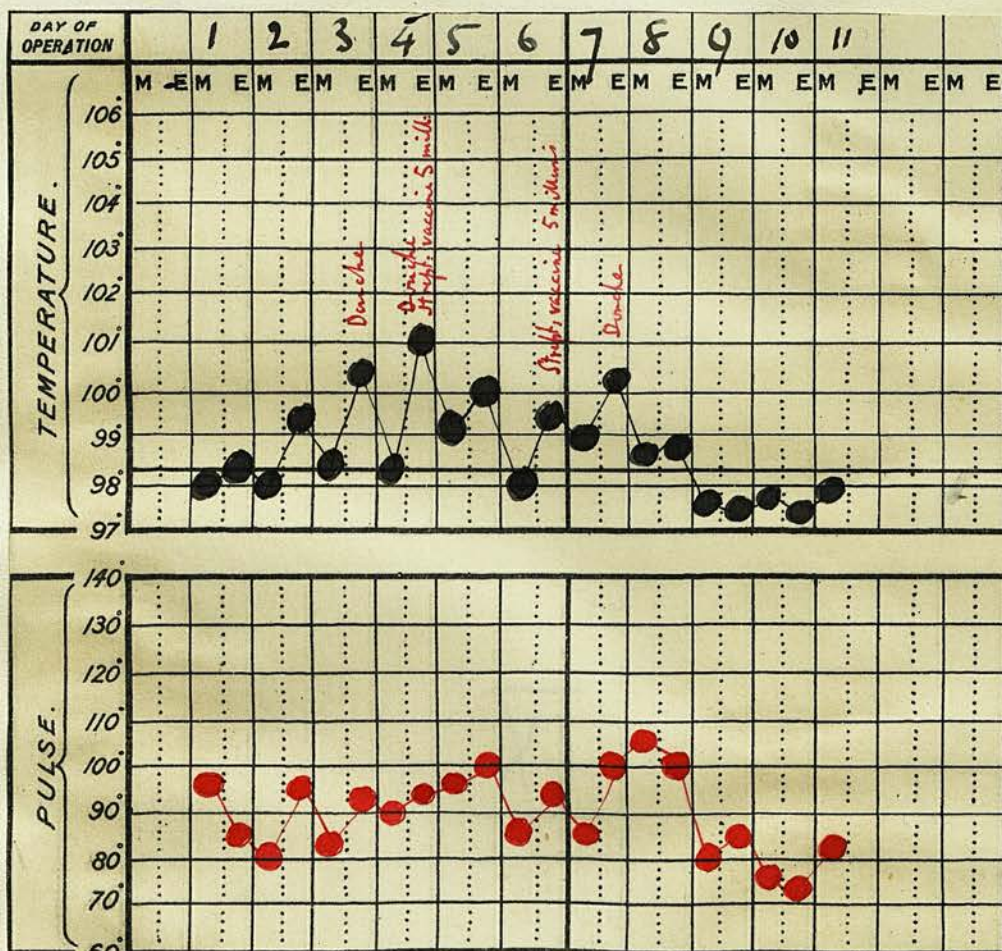
Case IX.

Mrs. E. D'A., 27 years. 1st Pregnancy.

Labour normal, Placenta complete, Membranes incomplete.

On 3rd evening patient was given an intra-uterine douche, a small piece of membranes removed, uterus plugged with Iodoform gauze. On the 4th evening patient was again given an intra-uterine douche, some clot and debris removed. Culture taken and show^{ed} diplococci in smear, no growth in culture, stock streptococcic vaccine 5 millions was given, also on 6th evening a second similar dose of vaccine was given. On the 3rd to 6th day lochia was slightly foetid. Patient made

a good recovery and was discharged on the 11th day.



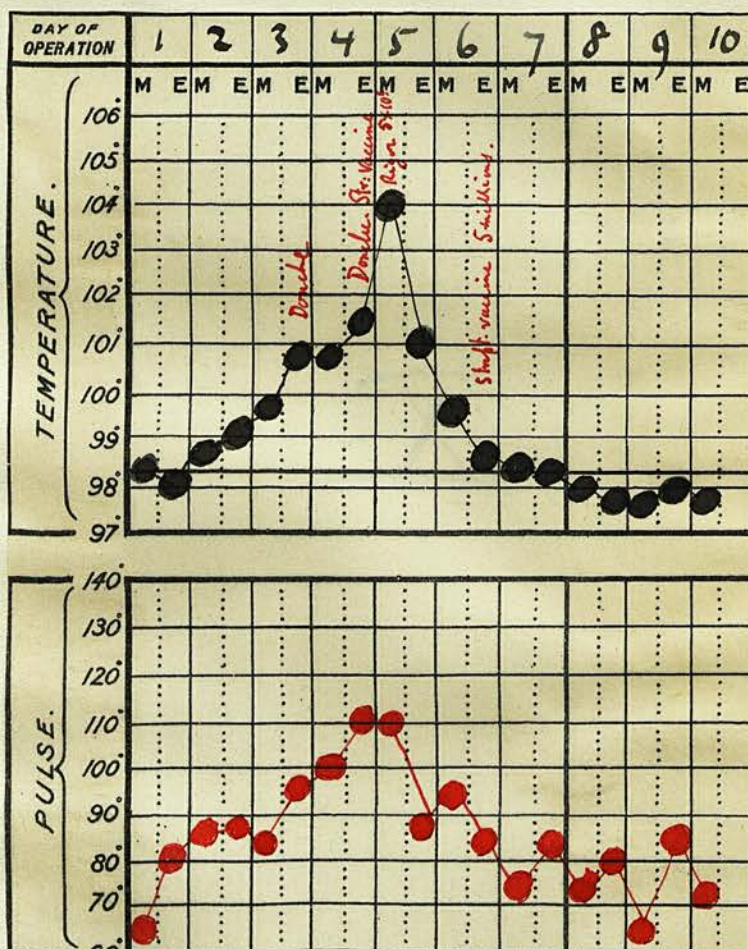
Case X.

Mrs. M.G., 28 years, 3rd Pregnancy.

Labour, normal. Placenta complete. Membranes incomplete.

For temperature and pulse see chart below. On 3rd evening patient was given an intra-uterine douche, uterus apparently empty. Uterus plugged with Iodoform gauze. On 4th evening uterus was again douched, nothing came away. Culture taken, showed diplococci and a small bacillus, patient was given Stock Streptococcic vaccine 5 millions and again on the 6th evening she received a similar dose. The lochia was normal.

Patient made a good recovery and was discharged from hospital on the 10th day.



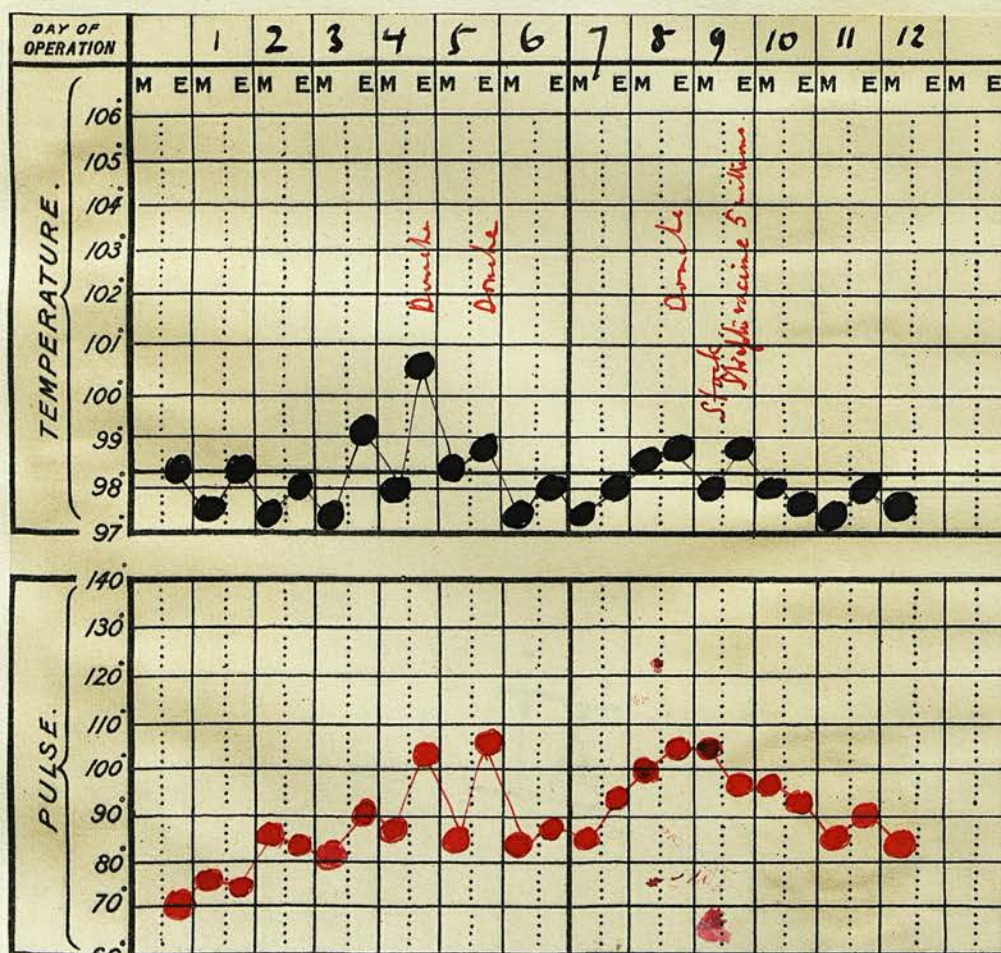
Case XI.

Mrs. M.B., age 21. 1st Pregnancy.

Normal labour, Placenta complete, membranes incomplete.

For temperature and pulse see chart below. On 4th evening patient was given an intra-uterine douche, some small shreds of membrane were removed, uterus plugged with Iodoform gauze. Culture taken showed diplococci plentiful. On 5th evening patient was given an intra-uterine douche, some clots and shreds of membrane removed. A culture was taken which showed diplococci to be present. On the 8th another intra-uterine douche was given and several large pieces of membrane were removed. On the 9th evening patient

was given stock streptococcic vaccine 5 millions. On the 4th to 6th days the lochia was offensive. Patient made a good recovery and was discharged from hospital on the 12th day.



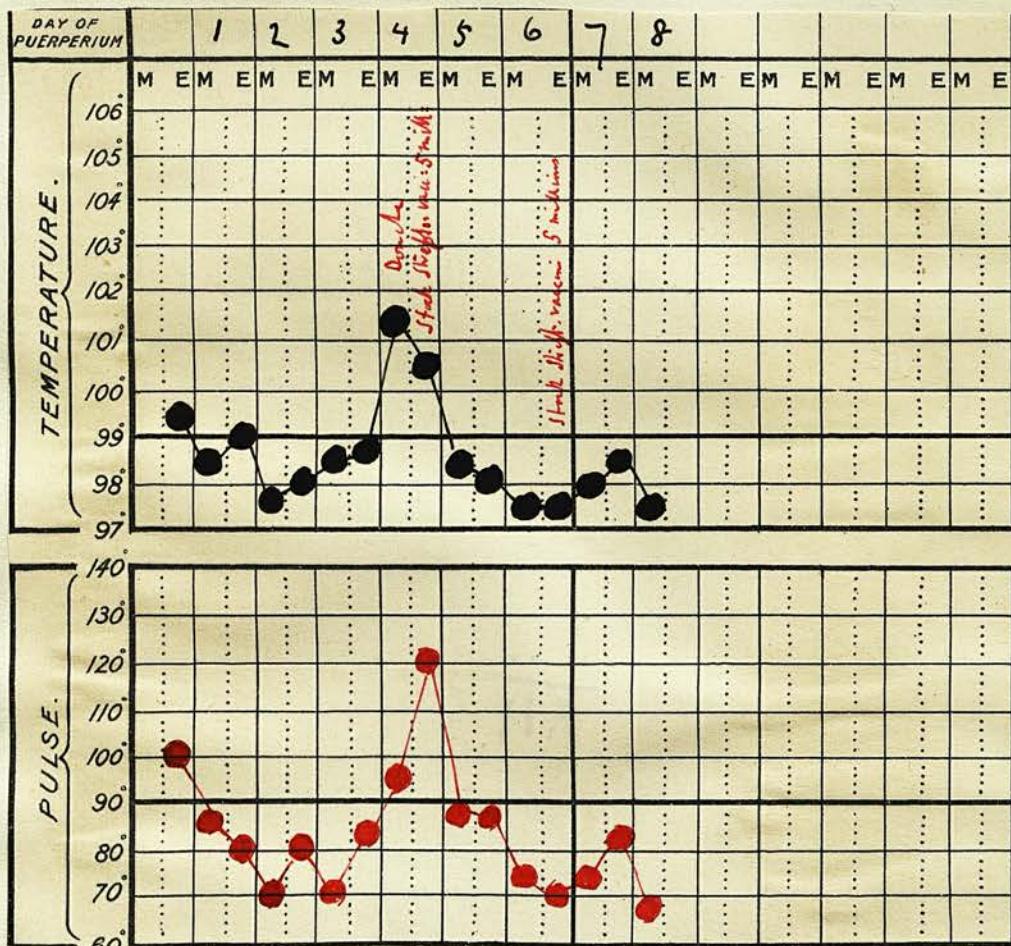
Case XII.

Mrs. R.D., 27 years, 7th Pregnancy.

Labour normal. Placenta complete. Membranes
incomplete.

Temperature and pulse as in chart below. On the 4th evening Patient was given an intra-uterine douche, several large pieces of membrane were removed, uterus was plugged with Iodoform gauze. A culture was taken which showed presence of streptococci. Patient was given stock Streptococcic vaccine 5,000,000. The lochia was normal. Patient made a good recovery

and was discharged on the 8th day.



Case XIII.

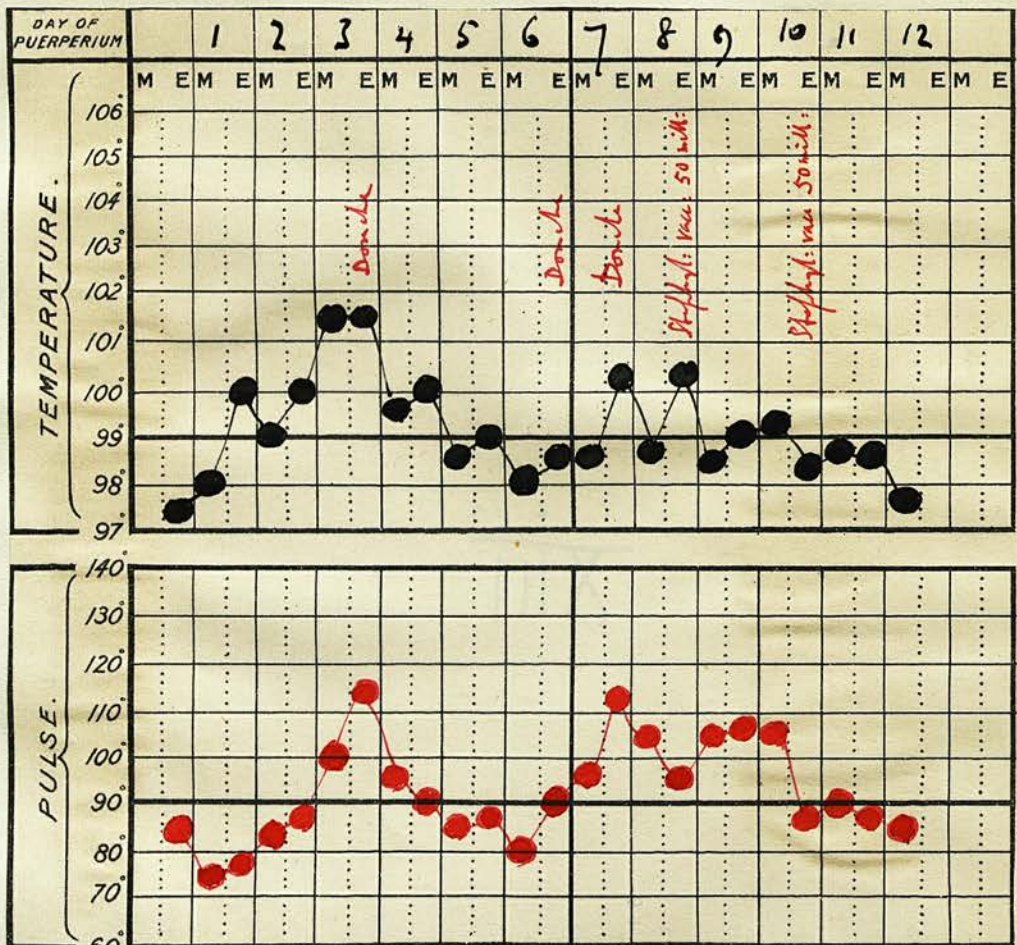
Mrs. A.C., 23 years, 2nd Pregnancy.

Normal labour. Placenta complete. Membranes torn.

small laceration of perinaeum -- one
stitch.

Temperature and pulse as in chart below. On 3rd evening patient was given an intra-uterine douche, some shreds of membrane were removed. A culture was taken which showed presence of diplococci. On 6th evening intra-uterine douche was repeated and some more shreds of membrane removed. On the 7th evening patient was again given an intra-uterine douche, uterus was empty and was plugged with Iodoform gauze. A culture was taken which showed presence of Staphylococcus

pyogenes aureus. On the 8th and 10th evenings patient was given Staphylococcic vaccine 50,000,000. The lochia was foetid on the 6th day. Patient made a good recovery and was discharged from hospital on the 12th day.



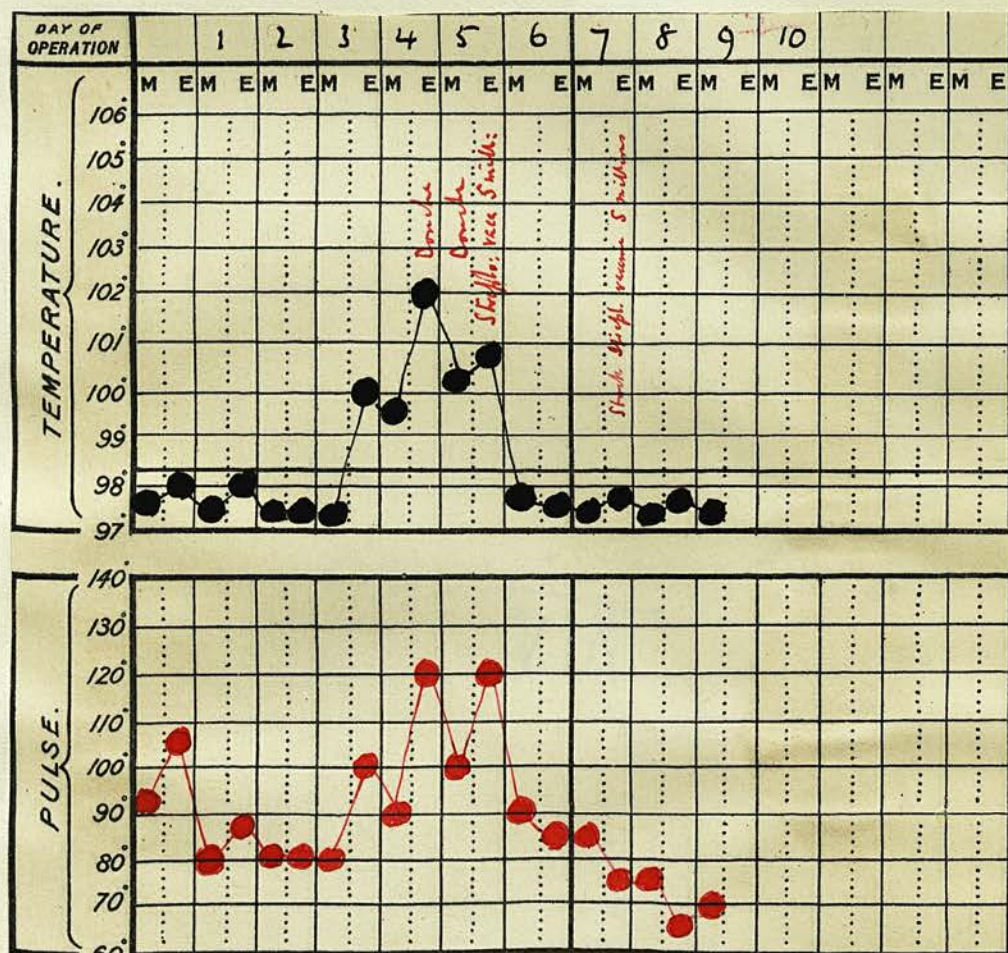
Case XIV.

Mrs. B.G., 29 years, 6th Pregnancy.

Normal labour, Placenta and Membranes complete.

Temperature and pulse as in chart below. On 4th evening patient was given an intra-uterine douche, some decidual debris and blood clots removed, uterus was plugged with Iodoform gauze. A culture was taken which showed presence of streptococci. On the 5th and 7th evenings patient was given stock Streptococcic vaccine 5 millions. The lochia was normal. Patient made a good recovery and was

discharged from hospital on the 9th day.



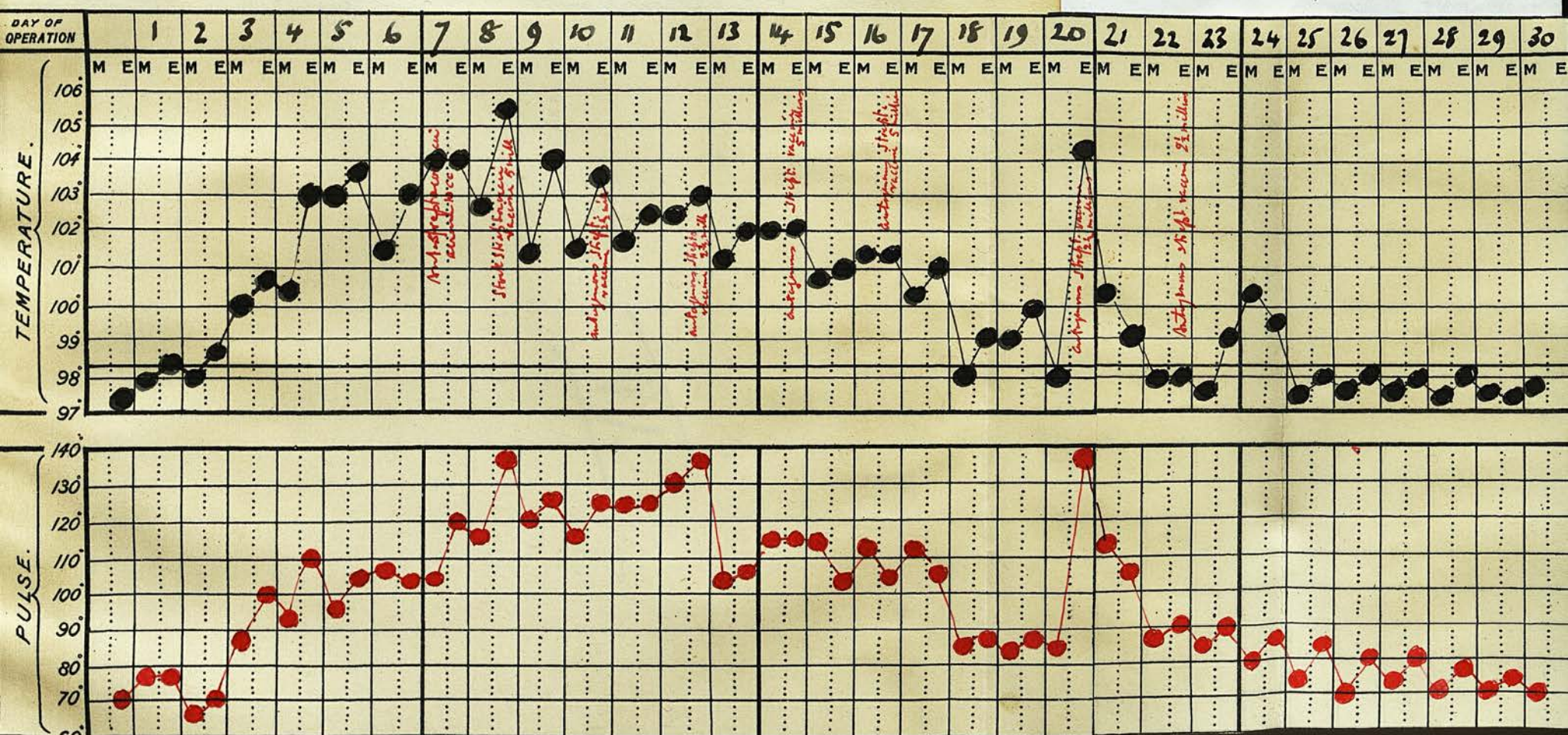
Case XV.

Mrs. M. McB., 24 years, 2nd Pregnancy.

Labour normal. Placenta complete, Membranes incomplete.

For Temperature and pulse see chart below. On 4th evening patient was given an intra-uterine douche, a quantity of membrane and debris was brought away with Rheinstadter curette, uterus was plugged with Iodoform gauze. On 5th evening patient was again douched and a culture taken which showed presence of streptococci. On 7th morning patient was given anti-streptococcic serum No. cc. On 8th morning she was given stock Streptococcic vaccine 5 millions. On the 10th and 12th evenings patient was given Autogenous streptococcic vaccine $2\frac{1}{2}$ millions. On the 14th and 16th evenings 5

millions autogenous streptococcic vaccine, on the 20th evening 2½ millions and on the 22nd evening 5 millions autogenous streptococcic vaccine. The lochia was normal throughout. The patient made a good recovery and was discharged on the 30th day.



Case XVI.

Mrs M.C., 19 years, 1st Pregnancy.

Labour normal, Placenta complete, Membranes incomplete.

For temperature and pulse see chart below. On 4th evening Intra-uterine douche was given and Manual exploration of uterus, a large amount of Membrane and decidual debris removed, uterus was packed with Iodoform gauze, culture was made from lochia and showed presence of streptococci. On 5th evening the same procedure was carried out and on both occasions a large amount of decidual debris was removed. On the 10th evening patient was given an intra-uterine douche a small quantity of decidual debris was removed. On the 14th evening patient was again douched, nothing came away from uterus. On the 17th and 21st evenings patient was

day.



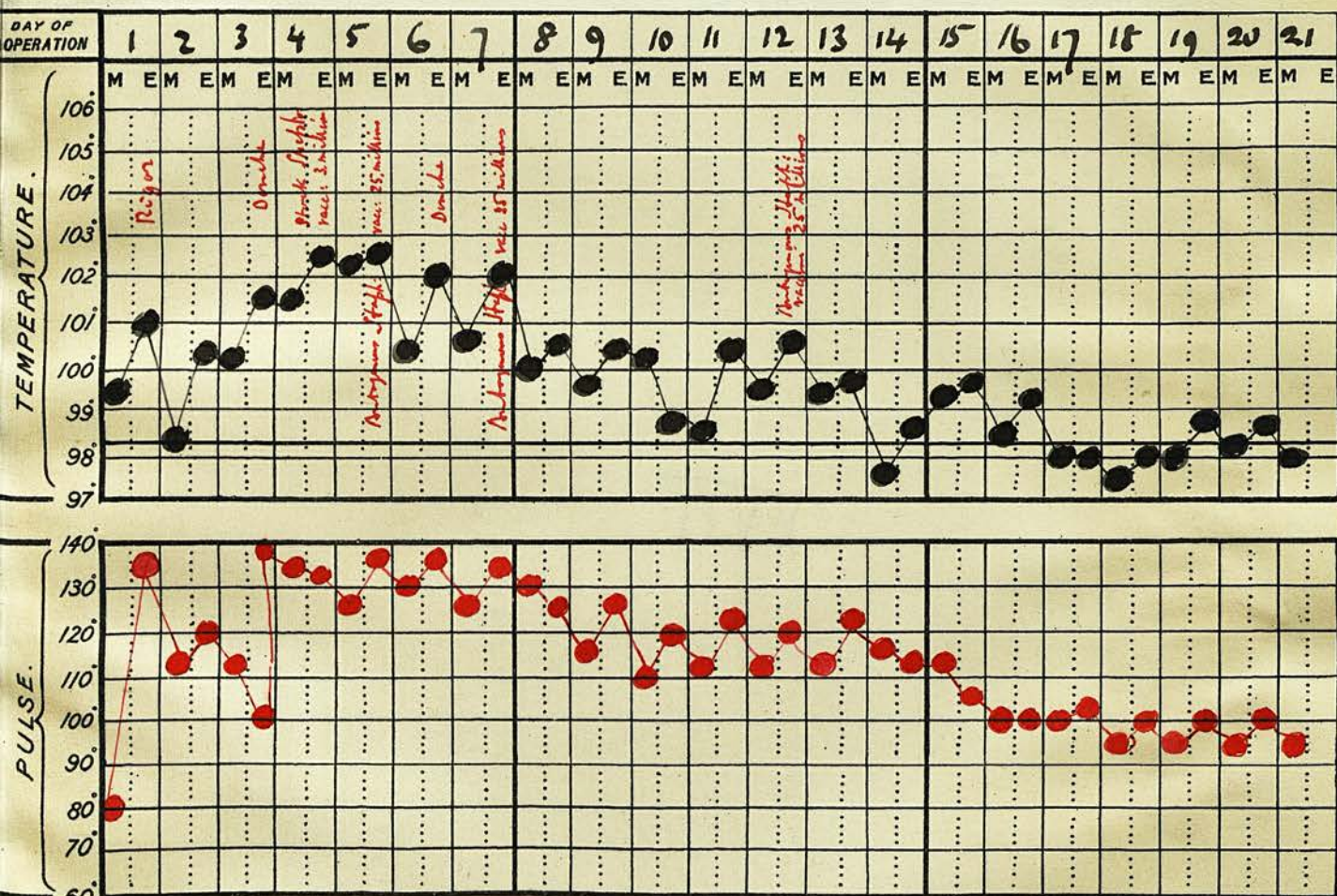
Case XVII.

Mrs. E.R., 25 years, 2nd Pregnancy.

Labour - adherent placenta Manual removal.

For temperature and pulse see chart below. On 3rd evening patient was given an intra-uterine douche, some decidual debris removed, plugged with Iodoform gauze. Culture was taken which showed staphylococcus aureus to be present. On 4th evening patient was given Stock Streptococcic vaccine. On 5th and 6th evenings patient was given an intra-uterine douche. On the 5th, 7th and 11th evenings patient was given autogenous Staphylococcic vaccine 25,000,000. From

the 5th to 11th day the lochia was foetid. Patient made a good recovery and was discharged on the 21st day.



Case XVIII.

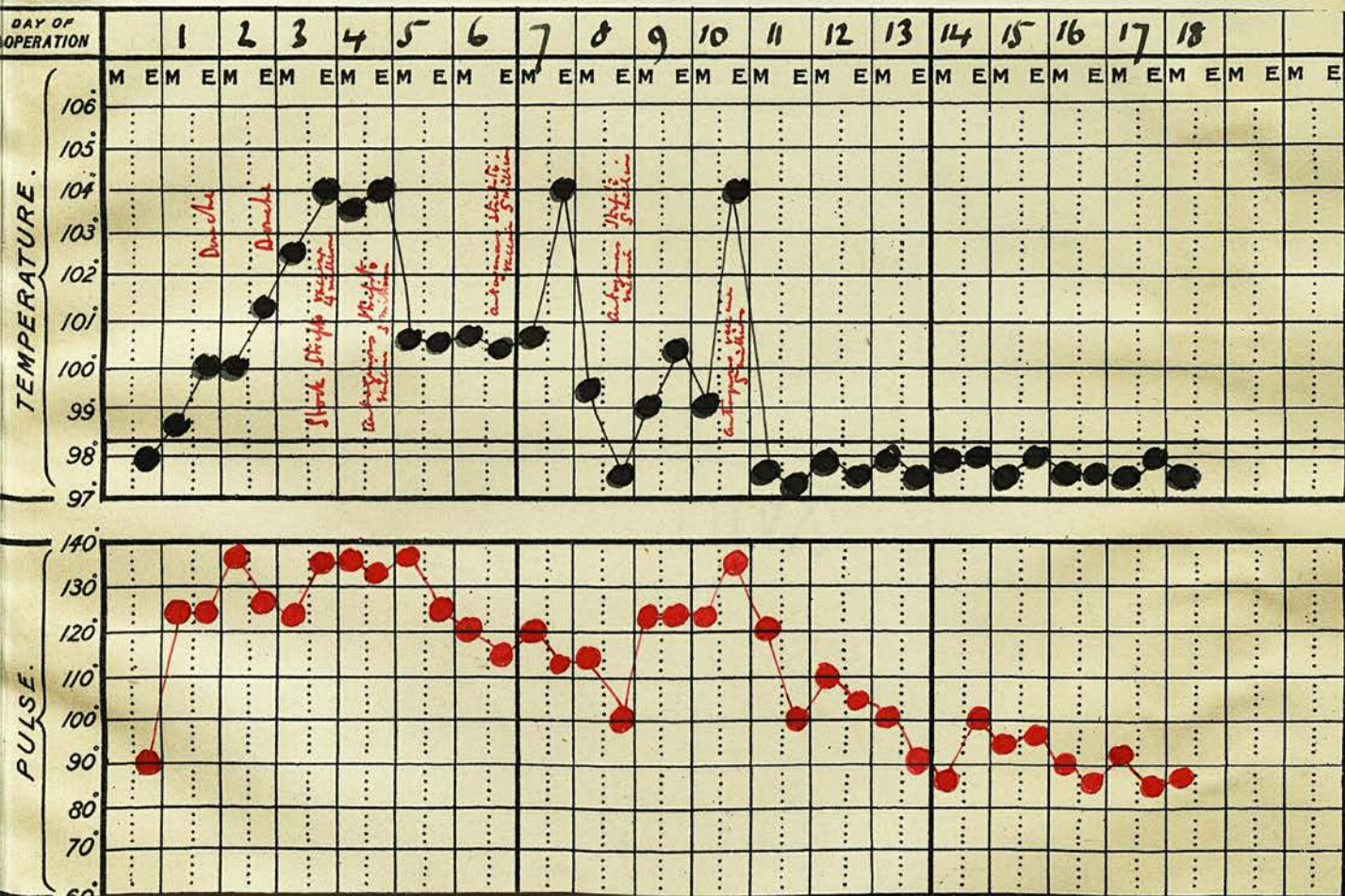
Mrs. K.S., 25 years, 1st Pregnancy.

Labour. Forceps delivery. Perinæum lacerated.

Placenta complete, Membranes incomplete.

On 1st evening patient was given an intra-uterine douche. Large pieces of membrane removed, uterus plugged with Iodoform gauze. Culture was made which showed presence of Streptococci. On 2nd evening patient was again douched and several pieces of membrane came away. On 3rd evening patient received a dose of Stock Streptococcic vaccine 4 millions; and on the 4th, 6th, 8th, and 10th evenings she was given autogenous Streptococcic vaccine 5 million each

evening. The lochia was normal throughout. Patient made a good recovery and was discharged from hospital on the 18th day.



Case XIX.

Mrs. E.P., 32 years, 5th Pregnancy.

Normal labour, Placenta complete, Membranes incomplete.

For temperature and pulse see chart below. On the 4th evening patient was given an intra-uterine douche a few small shreds of membrane and decidua were removed. Uterus plugged with Iodoform gauze. A culture was made which showed presence of Streptococci. On the 5th evening patient was given an intra-uterine douche and uterus explored manually, some debris removed, a retroflexion was present and was straightened, patient was given stock streptococcic vaccine $2\frac{1}{2}$ million. On the 6th evening patient was given another intra-uterine douche and some retained lochia washed out, uterus plugged with Iodoform gauze. On the 7th evening she

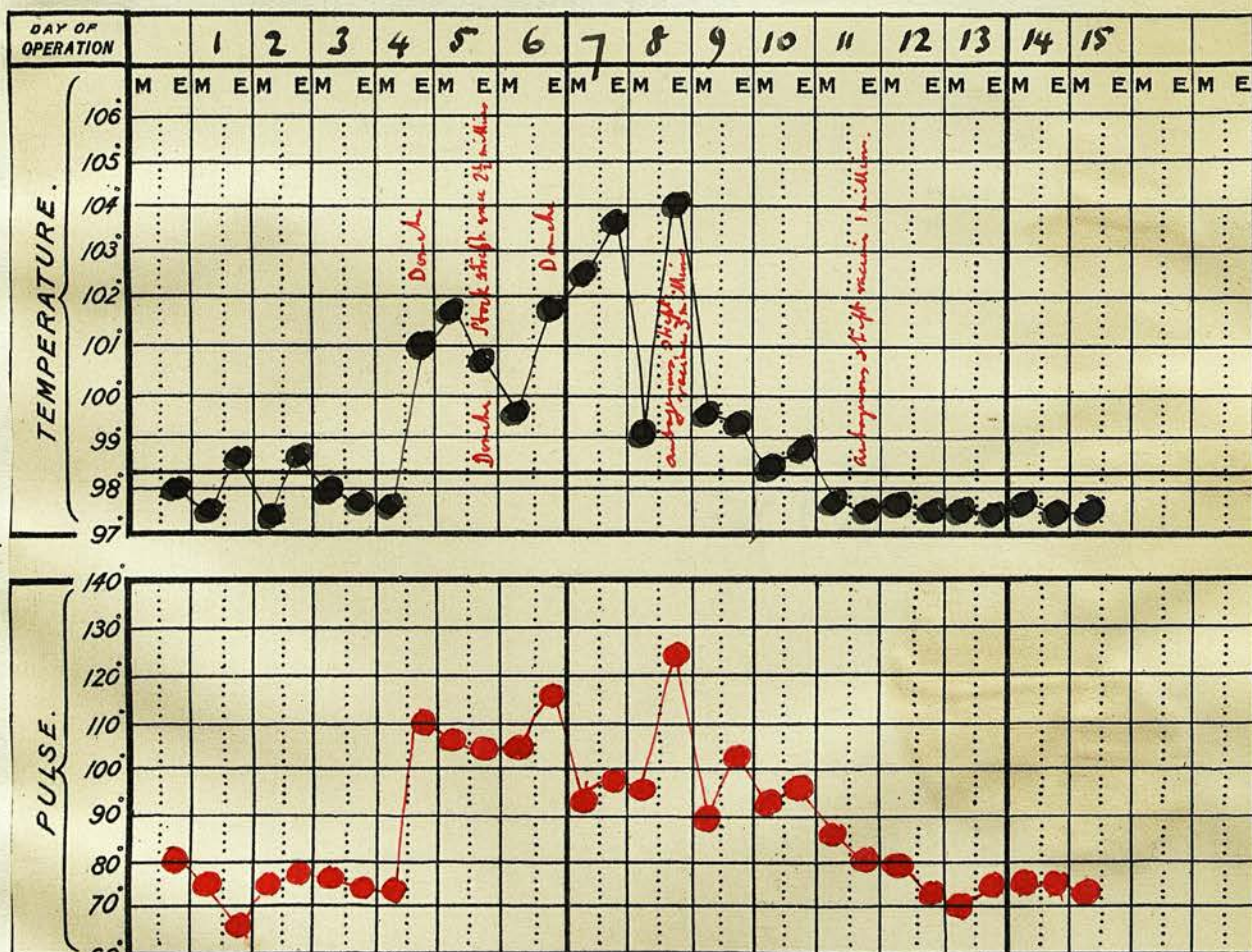
was given autogenous streptococcic vaccine 3 millions.

On the 10th evening patient was given a second dose

of autogenous vaccine 1 million. The lochia was

foetid on the 5th day. Patient made a good recovery

and was discharged on the 16th day.



In reviewing these cases I should like to emphasize the following points.

The method of administering the vaccine was that of repeated small doses at frequent intervals. The size of dose not being increased. The usual dose being 5 millions streptococcic vaccine every 2nd day and in the case of Staphylococcic infection 25 millions staphylococcic vaccine every 2nd day. The reason for this method of administration of vaccine is that if larger doses at longer intervals (as used in the treatment of chronic cases) of streptococcic or staphylococcic infection) had been given these patients who were already suffering from an acute infection with its accompanying low opsonic index would have been subjected to a further lowering of their opsonic index due to a marked negative phase following the employment of a large dose, and their powers of resistance being already markedly lowered this additional lowering of their resistance might have proved fatal. The marked negative phase following employment of vaccines was thus avoided by the administration of frequently repeated small doses.

The stock vaccine mentioned in the report of cases is not the commercial streptococcic vaccine but a vaccine prepared from a virulent strain of streptococcic

procured from a fatal case (Case I) occurring in the hospital, the reason of employing this vaccine is the strong suspicion amounting almost to a certainty that all cases occurring in any Maternity institution are due to one particular strain of streptococcus, which strain may or may not be included in the commercial streptococcic vaccine; great support is lent to this view by the fact that the administration of this hospital stock vaccine in isolated cases of puerperal infection occurring in the external maternity department at some distance from the hospital is found to be attended by distinctly less beneficial results than in the cases which were infected in the hospital.

In all cases where streptococci were discovered microscopically the stock vaccine was employed in the initial stages of the disease and if the symptoms did not improve under this treatment in each case an autogenous vaccine was prepared and administered (cases XV. XVII, XVIII, XIX.)

Clinically the cases of the severest type of septic infection manifested themselves by a sharp rise of pulse and temperature very early in the puerperium this is shown in cases I, XVII, XVIII. The remaining cases of a less severe type of infection do not show a

rise in pulse and temp. till the 3rd or 4th day. Cases V. and VI. show a sharp rise of Temperature on the 2nd day but no rise of pulse thus differing from cases I. XVII, XVIII therefore showing a less virulent form of infection.

With regard to the employment of the autogenous vaccine (Cases 13, 17, 18, 19) These cases all showed early sharp rise of temperature and pulse thus pointing to a virulent infection. In each case douching and stock vaccine were tried at first but on account of severity of symptoms continuing the patients were treated with their autogenous vaccines as soon as these were prepared. Case 19 shows a big reaction after the first autogenous dose so that only one other dose was necessary to complete the cure, the other 3 cases showed a variable but steady fall in both temperature and pulse and in each case a cure was affected after the administration of a few doses. The remaining case in which autogenous vaccine was used (case 16) shows that after repeated intra-uterine douches had failed to effect any lowering of temperature the administration of 2 doses of autogenous vaccine resulted in the immediate fall of both temperature and pulse which then remained normal.

The character of the labour in the cases treated is of interest. Eight cases were primiparae and eleven multiparae . Three were cases of Forceps delivery, four were cases of manipulative interference (2 manual removal of placenta 1 Bipolar version in placenta previa 1 Impacted Breech) eleven were cases of normal labour but in 9 of these the membranes were incomplete and in the remaining 2 there was slight laceration of the perinaeum. One case was an incomplete abortion where uterus was curetted with a Rheinstadter curette.

All the cases were subjected to the routine intra-uterine douching and in 13 of the cases pieces of membrane or decidual debris were removed.

In six of the cases the lochia was foetid during some period of the puerperium. In the remainder the lochia was normal throughout the puerperium.

The bacteriological report in these case was as follows --

in 13 Streptococci were present.

in 3 Staphylococci were present

in 3 Diplococci were present.

As regards the 3 cases in which diplococci were present, these were cases in which a diplococcus was found to be present in the smear but in which no growth was obtained in culture media, as these diplococci

were thought possibly to be streptococci in immature chains, the cases were treated with stock streptococcic vaccine.

In conclusion on a careful examination of this series of cases I think one may venture the opinion that vaccine therapy is of value in the treatment of puerperal infection.

I am inclined to think that the following line of treatment in puerperal infection is the most beneficial to adopt in the light of the facts brought to notice in these cases, In a more or less isolated case of puerperal infection which now and then must fall to the lot of all practitioners intra-uterine douching is the treatment first indicated followed if symptoms still persist by administration of commercial stock vaccine as being more easily obtained than an autogenous vaccine. The commercial stock vaccine would be administered in the hope that it may include the particular strain of streptococcus causing the infection, if this failed an autogenous vaccine would have to be prepared and administered. But in a series of cases occurring in a maternity institution or in a circumscribed locality as an epidemic, where there is a suspicion of the infection being due to some one causal agent the preparation and administration of an autogenous vaccine prepared from

one of these cases is imperative. Such a stock autogenous vaccine may be employed with probable good results in a whole series of cases but in any case in which no improvement from the employment of this vaccine has occurred it would be necessary to prepare for such a patient a separate autogenous vaccine.

Up to the present the number of cases of puerperal infection reported in which vaccine therapy has been employed is not very large, but all who have reported cases are of opinion that certainly in the subacute cases vaccine therapy is a reliable method of treatment, in the acute septicaemic type of cases this treatment has also been successful but naturally not so frequently

The cases I have collected in this paper confirm I think the results hitherto reported.

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